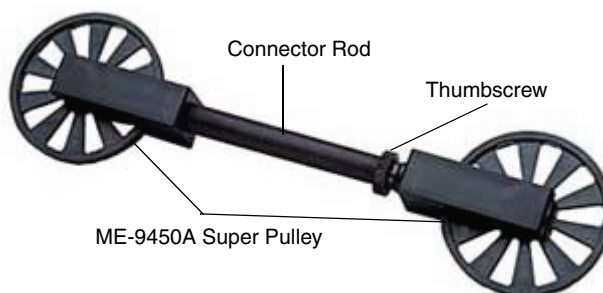




# Pulley Atwood's Machine

SA-9241



## Introduction

The PASCO Pulley Atwood's Machine is based on a device created by the Reverend George Atwood in 1784 to help demonstrate the mysteries of acceleration and force. In an *ideal* Atwood's Machine, two unequal masses are attached to a flexible, massless string which passes over a frictionless, massless pulley. (Please see Figure 1 below). The unequal gravitational forces acting on the two masses provide a constant force that accelerates both masses. The heavier mass is accelerated downward and the lighter mass is accelerated upward.

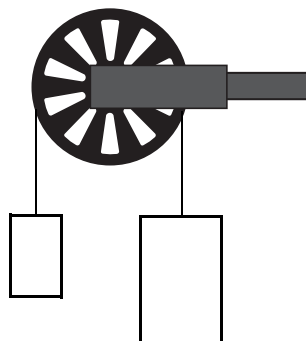


Figure 1

A real Atwood's Machine is not as simple as its ideal counterpart. The string is not massless and the pulley is not frictionless. The rotational inertia of the pulley also reduces the simplicity of the ideal Atwood's Machine.

By using two low friction pulleys at each end of a connecting rod, the effects of friction and rotational inertia are effectively reduced to a minimum.

PASCO scientific provides the Atwood's Machine shown above. Two ME-9450A Super Pulleys are mounted on a 6.3 centimeter (2.5 in) long, 0.9 cm (0.375 in) diameter rod. The connecting rod is easily mounted on standard lab rod clamps\* (not included). The PASCO Pulley Atwood's Machine (SA-9241) can handle masses up to a few kilograms.

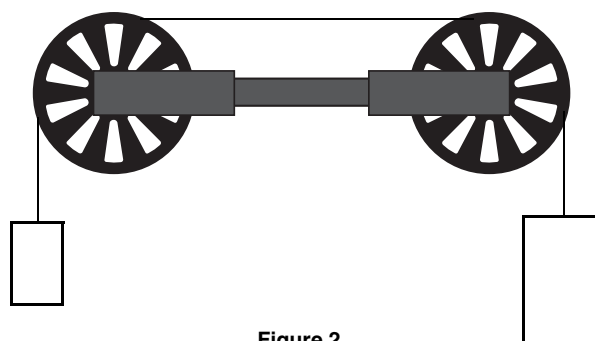
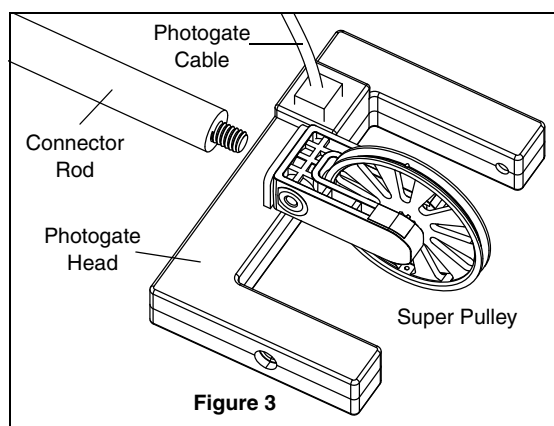


Figure 2

## Operation

The Atwood's Machine can be used with a Photogate Head, PASCO computer interface, and PASCO data acquisition software to allow measurement of the motion of one of the pulleys.

- Remove the Super Pulley from one end of the Connector Rod.
- Put the threaded end of the Connector Rod through the slot on the edge of the Photogate Head (see Figure 3).
- Re-connect the Super Pulley to the Connector Rod.
- Connect the Photogate Cable to the Photogate Head and plug the cable into a digital channel of a PASCO computer interface. (Note: For a PASCO interface without digital channels, use a PS-2159 Digital Adapter.)



Use the data acquisition software to record the motion of a pulley as the masses on the ends of the string move up and down. Analyze a graph display of velocity versus time to determine the acceleration.

### Additional Equipment Recommended:

- Photogate Head, PASCO Model ME-9498A
- Mass and Hanger Set, PASCO Model ME-9348
- Base and Support Rod, PASCO Model ME-9355
- String, PASCO Model SE-8050
- Adjustable Angle Clamp, PASCO Model ME-8744
- PASCO Computer Interface and Data Acquisition software\*

\*See the PASCO catalog or web site at [www.pasco.com](http://www.pasco.com) for more information.

**NOTE:** Illustrations are for reference only; appearance of your PASCO Pulley Atwood's Machine may vary.

## Technical Support

For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific  
10101 Foothills Blvd.  
Roseville, CA 95747-7100

Phone: 916-786-3800 (worldwide)  
800-772-8700 (U.S.)

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Web: [www.pasco.com](http://www.pasco.com)

Email: [support@pasco.com](mailto:support@pasco.com)

For more information about the Pulley Atwood's Machine and the latest revision of this Instruction Sheet, visit:

[www.pasco.com/go?SA-9241](http://www.pasco.com/go?SA-9241)

**Limited Warranty** For a description of the product warranty, see the PASCO catalog.

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